

# Scientific CV

## Stefan Manev Dodunekov

### 1. Areas of scientific expertise:

Areas: Mathematics, Informatics, Mathematics and Informatics education.

Research interests: Algebra, Number Theory, Combinatorial configurations, Algebraic and combinatorial theory of coding, Data protection, Communications.

### 2. Name and business address:

Stefan Manev Dodunekov

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### 3. Date and place of birth:

05.09.1945, Kilifarevo

### 4. Citizenship:

Bulgarian

### 5. Marital status:

Married, one child

### 6. Languages spoken:

Russian - spoken and written;

English - spoken and written;

Swedish - Spoken.

### 7. Education, degrees and titles:

- Higher education in mathematics at FMI, Sofia University, 1968.

- Candidate of Mathematical Sciences: University of Sofia- FMI, 1975;

Thesis: "Residual codes and Goppa codes." Scientific Supervisor: Associate Prof. Dr. Cyril Dochev

- Associate Professor, 1981.
- Doctor of Mathematics, IMI-BAS, 1986; Thesis: "Optimal linear codes."
- Professor, IMI-BAS, 1990.
- Corr. Member of the Academy of Sciences, 2004.
- Academician, 2008.

#### **8. Positions to date:**

- Programmer and Head of Department "Programming" at TIC - Veliko Tarnovo 1969 to 1972.
- Assistant, Senior Assistant, Chief Assistant at FMI- SU, 1972-1981.
- Associate Professor, IMI-BAS, 1981-1990.
- Professor, IMI, 1990 -

#### **9. Place of employment and position:**

IMI-BAS, Director.

#### **10. Scientific and lecturing activities:**

##### **a) Research projects**

*Internal projects ETSMM (later IMI):*

- Algebra
- Algebraic and combinatorial coding theory

*Academic, incl. international:*

- External storage devices (participation)
- Dependable computing systems (supervisor)
- Expert computing systems (supervisor)

*NSF projects:*

Managing six projects in the areas of mathematics and informatics - Data Protection

*International treaties of IMI-BAS with:*

- Institute for Information Transmission Problems- RAS
- Linköping University, Sweden
- University of Ulm, Germany

- University for Space Instrumentation, St. Petersburg, Russia

*Projects EBR:*

- Mathematical Institute of Hungarian Academy of Sciences:

- Combinatorics and applications;

- Discrete Mathematics, Coding Theory and Data Bases.

- Institute for Information Transmission Problems- RAS:

- Coding and cryptography.

- Belgium, the Flemish Fund:

- Algorithmic and theoretical study of combinatorial structures;

- Extreme geometrical structures, Coding Theory, Cryptography.

**b) Lecturing courses and seminars:**

Over 35 years of active lecturing and teaching.

*Courses in Bulgarian universities:*

- Algebra, Linear Algebra (Sofia University, VTU, BSU)

- Numbers Theory (VTU, SWU)

- Encryption and protection of data (SU, BFU, SWU)

- Communication and data transmission (BSU)

- Galois fields (SU)

- Algebra and Number Theory (NMHS)

- Security of data (Academy of Economics "D. Tsenov")

*Courses abroad:*

- Linear Algebra over Galois fields (Linköping )

- Combinatorics (Ulm, Linköping )

- Data Communications (Linköping , Gothenburg)

- Optimal linear codes (Delft)

- Coding Theory (Linköping , Gothenburg).

**c) Graduate and doctoral students:**

- Graduates - 5

- Doctoral students- in Bulgaria- seven and one with the right to present his thesis, abroad- 8 and one training at the moment.

**11. Publications, citations:**

- 124 scientific papers

- 3 books

- 12 textbooks and educational materials for secondary schools

- Cited more than 600 times

**12. Research and development activities:**

Fifteen author certificates for inventions

**13. Participation in scientific councils and scientific expert committees:**

- Assembly of IMI

- Assembly of IPP

- Assembly of ISER

- Assembly of IICT

- FC at FMI of the VTU

- SSC Mathematics, Informatics and Mechanics at HAC

- Scientific Council for Informatics and Applied Mathematics at HAC

- SSC Informatics and Mathematical Modelling at HAC

- SSC in electronic and computer equipment at HAC

- Committee on Mathematical Sciences of the HAC (Deputy President)

- NEC in Informatics, NSF

- Commission of Education to develop SER at Mathematics secondary schools (Chair)

- Commission of Education to develop programs on Mathematics for secondary schools (Chair)

**14. Membership in national and international professional organizations:**

- Union of Mathematicians in Bulgaria (Chairman)

- IEEE Information Theory Society

- American Mathematical Society
- Combinatorial Society of China
- MASSEE (Math. Society of South-Eastern Europe), President, Council Member

**15. Administrative and managerial experience:**

- Head of Department in the TIC - Veliko Tarnovo 1969-1972
- Secretary and Vice President of UMB
- Section Head and Deputy Director of the IMI
- Director of IMI: 1999 -
- Chairman of UMB: 2001 -
- Member of the General Assembly of BAS: 2000-2008.

20/05/2012

Signature:

Sofia

**Appendix**

**1. Information for participation with reports at scientific conferences at home and abroad**

- 1979 5<sup>th</sup> International Symposium on Information Theory, Tbilisi, Georgia
- 1984 6<sup>th</sup> International Symposium on Information Theory, Tashkent, Uzbekistan
- 1985 IEEE International Symposium on Information Theory, Brighton, England
- 1986 IEEE International Symposium on Information Theory, Ann Arbor, USA
- 1986 Tenth Prague Conference on Information Theory, Prague, Czechoslovakia
- 1987 Third International Workshop on Information Theory, Sochi, USSR
- 1988 International Workshop on Algebraic and Combinatorial Coding Theory, (ACCT) Varna, Bulgaria
- 1988 First International Conference on Combinatorics and Applications, Tunxi, China
- 1988 Conference on Information Theory, Oberwolfach, Germany
- 1989 Fourth International Workshop on Information Theory, Gottland, Sweden
- 1990 International Workshop on Information Theory, Eindhoven, The Netherlands

1990 ACCT'2 Leningrad.

1992 International Workshop on Algebraic and Combinatorial Coding Theory, (ACCT) Voneshta Voda, Bulgaria

1992 International Conference on Combinatorics, Houghton, USA

1993 Swedish-Russian International Workshop on Information Theory, Mölle, Sweden

1994 IEEE ISIT, Trondheim, Norway

1994 ACCT'4 Novgorod, Russia

1995 OC'95, Sozopol, Bulgaria

1996 ACCT'5 Sozopol, Bulgaria 8

1998 ACCT'6 Pskov, Russia

1998 International Symposium on Information Theory, Bielefeld, Germany

2001 OC'2001, Sunny Beach, Bulgaria

2002 ACCT'8 Tsarskoe Selo, Russia

2002 General Theory of Information Transfer and Combinatorics, Bielefeld, Germany

2003 First Mathematical Congress of MASSEE, Borovets, Bulgaria

2003 Coding for Klove, Bergen, Norway

2004 ACCT'9 Kranevo, Bulgaria

2005 OC 2005, Pamporovo, Bulgaria

2005 International Symposium on Information Theory, Adelaide, Australia

2007 International Workshop on Coding and Cryptography, Versailles, France

2007 OC'2007, White Lagoon, Bulgaria

## **2. Information for participation in organizational, scientific and programme committees**

- Chair of the Program Committee of the Annual Spring Conference of the UBM, Albena, 1989.

- Co-Chair of the Organizing Committee of the International Workshops on Algebraic and Combinatorial Theory (ACCT), 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012 (seven in Bulgaria, six in Russia).

- Member of the Program Committees of the International Workshops on Optimal Codes and Related Topics, 1995, 1998, 2001, 2003, 2005, 2007, 2009 (Bulgaria).

- Member of the Program Committees of the IEEE International Symposium on Information Theory, Ulm, Germany, 1997.
- Member of the Program Committee of the International Workshop on Coding and Cryptography, France, 2001, 2003.
- Chair of the Organizing Committee of the First Mathematical Congress of MASSEE, Bulgaria, 2003.
- Chair of the Organizing Committee of the Balkan Mathematical Olympiad 2004, Pleven, Bulgaria.
- Chair of the Program Committee of the Second Mathematical Congress of MASSEE, Cyprus, 2006.
- Chair of the Organizing Committee of the International Conference on Algebraic Computations and Applications 2006, Varna, Bulgaria.
- Chair of the Organizing Committee of the Junior Balkan Mathematical Olympiad 2006, Shumen, Bulgaria.
- Chair of the Organizing Committee of the International Conference "New Trends in Mathematics and Informatics", 60 years IMI-BAS, July 6-8, 2007.
- Chair of the Program Committee of the Third Mathematical Congress of MASSEE, September 16-20, 2009, Ohrid, Macedonia.
- Co-Chair of the Organizing and Program Committees of the Fourth International Conference "Informatics in the Scientific Knowledge ", June 27-29, 2012, Varna, Bulgaria.
- Local Chair of the 18<sup>th</sup> International Conference on Applications of Computer Algebra, June 25-28, 2012, Sofia, Bulgaria.

### **3. Information for membership in international and foreign scientific organizations and academies**

- Union of Mathematicians in Bulgaria – since 1972.
- American Mathematical Society: 1976 – 1994; 2002 -
- IEEE Information Theory Society: 1990.
- Combinatorial Society of China: 1989.
- Mathematical Society of Southeastern Europe: since 2003.
- Mathematical Association of America: since 2005.

### **4. Reviews and editorial work**

- Member of the editorial boards of the Bulgarian Mathematical Journal "Serdika", of Mathematica Balkanica, of International J. of on Information Technologies and Applications, of the Asian-European Journal of Mathematics, of the Journal of Mathematics.
- Founder and editor of Serdica Journal of Computing.

- Reviewer of the journals IEEE Trans. Inform. Theory; Designs, Codes and Cryptography; Ars Combinatoria; Discrete Mathematics; Discrete Applied Mathematics; Mathematical Reviews; Serdica; Journal of Combinatorial Theory; AAEECC; Problems of Information Transmission etc.

- Over 50 reviews of procedures for the defence of dissertations and habilitation in the country.

- Three reviews for professorships abroad: R.Hill (England), D.Jaffe (USA), Thomas Honold (Germany).

#### **5. List of inventors' certificates for inventions**

1. Device for correcting errors. № 1216832/04.07.1984. USSR State Committee (S.M.Dodunekov et al).

2. Device for correcting errors. № 39766/04.07.1984. INRA (S.M.Dodunekov et al).

3. Device for correcting triple errors. № 40139/24.09.1986. INRA (SM Dodunekov et al).

4. Decoder for error correction. № 1295531 / 04.01.1985. USSR State Committee (S.M.Dodunekov et al).

5. Parallel device for multiplication in Galois fields. № 1383338 / 24.04.1986. USSR State Committee (S.M.Dodunekov et al).

6. Parallel-serial device to multiply in the Galois fields. № 1399725/24.04.1986. State Committee of the USSR (S.M.Dodunekov et al).

7. Sequential-parallel device to multiply in the Galois fields. № 41441 / 12.30.1985. INRA (S.M.Dodunekov et al).

8. Parallel device for multiplication in Galois fields. № 41 272 / 12.30.1985. INRA (S.M.Dodunekov et al).

9. Parallel device to multiply in Galua field  $GF(2^n)$ . № 44346 / 17.07.1987. INRA (S.M.Dodunekov et al).

10. Parallel device for multiplication in Galois field  $GF(2^n)$ . № 1499334 / 06.07.1987. USSR State Committee (S.M.Dodunekov et al).

11. Decoding device for error correction. № 45997/10.05.1988. INRA (S.M.Dodunekov et al).

12. Device for correcting packet errors. № 49259/29.09.1989. INRA (S.M.Dodunekov et al).

13. Calculator for addresses and error. № 48089/14.04.1989. INRA (S.M.Dodunekov et al).

14. Device for correcting distortion in transmission systems discrete information. № 1603532/24.03.1987. USSR State Committee (S.M.Dodunekov et al).

15. Device for correcting errors. № 1552381/22.11.1989. USSR State Committee (S.M.Dodunekov et al).

#### **6. Reports carried out by invitation and costs covered by the host country**

1982 Debrecen University, Hungary

1984 Moscow State University, Moscow



1985 Institute of Mathematics with Computer Center, Armenian Academy of Science, Erevan

1985 Institute of Mathematics, Georgian Academy of Sci., Tbilissi

1987 Eindhoven University of Technology, The Netherlands

1988 Linköping University of Technology, Sweden

1988 University of Lund, Sweden

1988 University of Turku, Finland 12

1989 Technical University of Munich, Germany

1989 Mathematical Institute, Heidelberg University, Germany

1989 Linköping University of Technology, Sweden

1989 University of Lund, Sweden

1989 University of Turku, Finland

1989 University of Bergen, Norway

1991 Royal University of Technology, Stockholm

1992 DLR, Munich, Germany

1992 Technical University, Ulm, Germany

1992 Institute of Experimental Mathematics, Essen, Germany

1992 Institute for Problems of Information Transmission, Moscow, Russia

1994 Technical University, Ulm, Germany

1994 Technical University, Ulm, Germany

1994 Delft University of Technology, Delft, The Netherlands

1994 Technical University, Munich, Germany

1994 Delft University of Technology, Delft, The Netherlands

1995 Chalmers University of Technology, Sweden

1997 Eindhoven University of Technology, The Netherlands

1998 Linköping University, Sweden

1999 Linköping University, Sweden

1999 Rutgers University, USA

1999 Institute of Mathematics, Hungarian Academy of Sciences, Budapest

2001 Chalmers University of Technology, Sweden

2001 Institute of Mathematics, Hungarian Academy of Sciences

2002 University of Bergen, Norway

2002 Institute for Problems of Information Transmission, Moscow, Russia

2003 University of Magdeburg, Germany

2003 Linköping University, Sweden

2003 University of Bergen, Norway

2004 Institute of Mathematics, Hungarian Academy of Sciences, Budapest

2004 Technical University, Budapest

2005 Institute of Mathematics, Hungarian Academy of Sciences 13

2005 Tel Aviv University, Israel

2006 Institute of Mathematics, Serbian Academy of Science and Art, Belgrade

2007 Postech University, South Korea

2007 Chonbuk University, South Korea

2007 University of Bergen, Norway

2007 Gent University, Belgium

2007 Katholieke Universiteit Leuven, Belgium

2007 Tel Aviv University, Israel

2008 University of Memphis, USA

2010 Chonbuk University, South Korea

#### **7. Information for visits as a visiting researcher and visiting professor**

February 1983 - August 1985

**Institute for Problems of Information  
Transmission, AN SSSR, Moscow**

Visiting Professor

October 1990 - January 1992

**Department of Electrical Engineering (Data Transmission Group)  
Linköping University of Technology**

Visiting Researcher

September 1993 - June 1994

May 1998

May - June 1999

Visiting Professor

November 1992 - February 1993

**Department of Information Theory, Chalmers University of  
Technology**

November 1994 - January 1995

October 1996 - December 1996

Visiting Professor

October 1994

**Department of Information Theory, Technical University, Ulm**

Visiting Professor

January 1997 - June 1997

**Department of Applied Mathematics and Informatics, Delft  
University of Technology**

Visiting Professor

February 2002

**LACO, University of Limoges**

Visiting Professor

September - October 2001

**Institute of Informatics, University of Bergen, Norway**

October - November 2003

Visiting Professor

October - November 2004

**Alfred Renyi Institute of Mathematics, Hungarian Academy of  
Sciences**

April - May 2005

Guest Researcher

November 2007

**Postech University, South Korea**

Visiting Professor

## **8. Information for the preparation of staff**

### ***List of doctoral students (at home and abroad) with the themes of their thesis***

- Vassil Yorgov, Cyclic and Self-Dual Codes, PhD Thesis, University of Sofia, 1982.
- Nikolai Manev, Griesmer bound and optimal codes, PhD Thesis, Inst of Math. Sofia, 1984.
- Evgenia Velikova, On the covering radius of classes of linear codes, PhD Thesis, University of Sofia, 1992.
- Silvia Encheva, Optimal binary linear codes, PhD Thesis, University of Bergen, 1992.
- Peter Boyvalenkov, Bounds on packings in Euclidean spaces, PhD Thesis, Center for Informatics and Computer Technology, Sofia, 1993.
- Aleksander Ivanov (with the right to defend thesis).
- Vassil Dimitrov, Number theoretical algorithms for digital information processing, PhD Thesis, IMI-BAS, Sofia, 1995.
- Roumen Daskalov, Bounds for binary and ternary linear codes, PhD Thesis, IMI-BAS 1994.
- Svetla Nikova, Bounds on designs in in Galois polynomial metric spaces, PhD Thesis, Eindhoven Univ. Techn., 1998. Co-Promotor.
- Peter Kazakov, Application of polynomials to CRC and spherical codes, PhD Thesis, Delft Univ. Techn. , Nov. 1999. Co-Promotor.
- Sugi Guritman, Restrictions on the weight distribution of linear codes, Delft Univ. Techn. . Sept. 2000.Co-Promotor.
- Silvia Boumova, Application of polynomials to spherical codes and designs, PhD Thesis, Eindhoven Univ. Techn., Febr. 2002. CoPromotor.
- Radinka Dontcheva, Constructing self-dual codes using an automorphism group. PhD Thesis, Delft Univ. Techn., Sept. 2002. Co-Promotor.

- Veselin Vavrek, Linear Codes and Conference Matrices, PhD Thesis, Delft University of Technology, Febr. 2005, Co-Promotor.

- Evgenia Nikolova, Proper Codes for Error Detection, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, June 2005. Co-Promotor.

- Diana Radkova, Constacyclic codes as invariant subspaces, Delft University of Thecnology, Jan. 2009, Co-Promotor.

### **List of my participation in doctoral procedures abroad**

- Magnus Nilsson, Linear Block Codes over Rings of Phase Shift Keying, LiU, Diss. No.321, 1993.

- Peter Butovitsch, Classification of Signal Sets, PhD Thesis, KTH, Stockholm, 1994, ISSN 1103-8039 (Faculty opponent).

- Mario de Boer, Codes, Their Parameters and Geometry, PhD Thesis, Eindhoven Univ. Techn., Nov. , 1996.

- C. Durairajan, On Covering Codes and Covering Radius of Some Optimal Codes, PhD Thesis, Dept. Math. Indian Institute of Technology, Kanpur, March 1996.

- Augung Lukito, Bounds for the Length of Certain Types of Distance-preserving Codes, PhD Thesis, Delft University of Technology, Oct. 2000.

- Nengah Suparta, Counting Sequences, Gray Codes and Lexicodes, PhD Thesis, Delft University of Technology, May 2006.

- Maria Gabrowska, On Space Time Concatenated Codes, PhD Thesis, Ulm University, May 2006 (Gudachter).

- Loeky Haryanto, Constructing Snake-in-the-box Codes and Families of such Codes Covering the Hypercube, PhD Thesis, Delft University of Technology, January 2007.

- Iliya Mitov, Class Association Rule Mining Using Multidimensional Numbered Information Spaces, PhD Thesis, Hasselt University, Belgium, November, 2011.

- Krassimira Ivanova, A Novel Method for Content-Based Image Retrieval in Art Image Collections Utilizing Color Semantics, PhD Thesis, Hasselt University, Belgium, November, 2011.

### **University lecture courses**

#### ***At home***

- Linear Algebra, Higher Algebra, Coding Theory (FMI of SU);

- Linear Algebra, Higher Algebra, Number Theory (FMI of VTU);

- Number Theory, Coding and cryptography, Combinatorics, coding and cryptography (SWU - Blagoevgrad);

- Encryption and data protection, Communication and transmission of data (Burgas Free University);

- Security of Data (Economic Academy "DA Tsenov" - Svishtov).

### **Abroad**

- Undergraduate Course on Coding Theory, 1993/94, Department of Electrical Engineering, Linköping University, Sweden;

- Graduate Course on Combinatorics, 1993/94, Department of Electrical Engineering, Linköping University, Sweden;

- Graduate Course on Linear Algebra, 1993/94, Department of Electrical Engineering, Linköping University, Sweden

- Undergraduate Course on Data Communication, 1992/93 and 1994/95, Department of Information Theory, Chalmers University of Technology, Sweden, 1998 - Linköping University, Sweden.

- Graduate Course on Coding and Combinatorics, 1994, Department of Information Theory, Technical University of Ulm, Germany.

- Undergraduate Course on Coding Theory, 1992/93, Institute of Mathematics, Chalmers University of Technology and University of Götteborg, Sweden

- Advanced Course on Optimal Codes, 1997 - Delft University of Technology, The Netherlands.

### **Published books and textbooks**

Together with G.Kozhuharova, M.Hristova, D.Kapralova and Sv.Doychev:

1. Mathematics for mandatory training. 9<sup>th</sup> grade, Regalia 6, Sofia, 2001
2. Mathematics for specialized training. 9<sup>th</sup> grade, Regalia 6, Sofia, 2001
3. Mathematics for mandatory training. 10<sup>th</sup> grade, Regalia 6, Sofia, 2002
4. Mathematics for specialized training. 10<sup>th</sup> grade, Regalia 6, Sofia, 2002 18
5. Mathematics for mandatory training. 11<sup>th</sup> grade, Regalia 6, Sofia, 2002
6. Mathematics for specialized training. 11<sup>th</sup> grade, Regalia 6, Sofia, 2002
7. Mathematics for specialized training. 12<sup>th</sup> grade, Regalia 6, Sofia, 2003
8. Mathematics for mandatory training. 12<sup>th</sup> grade, Regalia 6, Sofia, 2004
9. Mathematics for mandatory training. 8<sup>th</sup> grade, Regalia 6, Sofia, 2004
10. Solutions to the Problems of the textbook for grade 9. Regalia 6, Sofia, 2004
11. Solutions to the Problems of the textbook for 10<sup>th</sup> grade. Regalia 6, Sofia, 2005
12. Solutions to the Problems of the textbook for 11<sup>th</sup> grade. Regalia 6, Sofia, 2005

The first six were approved as regular textbooks for education; the others were used as teaching aids.

In 2006 and 2007 together with B. Lazarov, G.Kozhuharova , Sv. Doychev, B. Banchev and D. Vassileva we created one of the first electronic textbooks in the country for mathematics for grades 9, 11 and 12, ordered by the Ministry of Education Publishing House "Trud".

At <http://content.e-edu.bg/course/category.php?id=72> the textbook for Grade 9 can be seen.

#### **Other lecturing activities**

- Courses at the National High School Mathematics: Algebra, Number Theory, Combinatorics.
- Lecturer at the company for the spreading of knowledge "G.Kirkov" - lecture group in mathematics.
- Lectures in courses and training of national teams in mathematics (students) for the International Mathematics Olympiad.